Reviewers’ Comments and Explanations

Comments of Examiner-I

The research that has been conducted attempts to examine the significance of the three components of MCH services: pre delivery, delivery and post delivery. In addition, there is investigation into the linkages between these and initiation of contraceptive use. Though these areas have been researched, the PhD. scholar contends that earlier studies have not fully accounted for selection bias. NFHS data have been used to understand the relationships. She was able to utilize NFHS data set that are available and data that have limited accessibility. To remove the bias Propensity Score Matching was used and multilevel logistic regression analysis was applied to provide for estimates. After applying the statistical procedures the researcher concludes that visiting health centre improves the chances of delivery and immunization and the selection bias overestimates the influence. Consequently use is promoted by utilization of MCH services. The contributions of the scholar increase our understanding of the linkages. Some questions, however, linger in the mind of a reader which are given below so that clarifications can be sought and considered for improving the thesis.

The statement of the problem requires changes so that it can reflect more clearly the focus of the thesis. There is enough literature to suggest the nature of linkages that are possible. The scholar referred to attitudes, beliefs and motivation on p.67 but there is limited reference to it in the statement. The importance of conceptual framework need not be stressed. The impression that one obtains from the thesis is that limited thought has been given for the conceptual framework given on p.20. The relationship between the concepts needs to be explained. Also the reasons for highlighting the relationships can be explained better.

Response: I am very much thankful to the reviewer for his/her constructive comments.
The statement of the problem is clearly stated in the text. However, some specific references have been added, which are given below. As per the examiner suggestion we have given more explanation of conceptual framework.


*Explanation of Conceptual Framework*

Many researchers have examined the determinants of MCH and contraceptive use, from both the providers’ and clients’ perspectives. The customized conceptual framework builds on existing knowledge to analyze the association between pre delivery, delivery, post delivery utilization and contraceptive adoption and explores the responsible socio-economic and demographic factors. Demographic factors such as age and parity of respondent and whether women ever had child loss represent biological urge that women need health services. Social structure is measured by a broad array of factors like religion, caste, education of women and their husband that determine the status of person in the community and his or her ability to utilize health care services. Once women utilize a particular MCH service, for example, when she visits to the health center for ANC, health workers motivates women and provides information about subsequent MCH services. The motivation and information about MCH services change the beliefs, attitudes, and knowledge among women and consequently might influence their use of subsequent MCH services like delivery of birth in an institution, postnatal care and child immunization. The motivation, beliefs and attitudes also influence their use of health care services for higher order birth. Moreover, utilization of MCH services contributes to woman’s trust and satisfaction in the health care system which in turn may
make women more likely to return for adoption of family planning methods. The conceptual framework is presented in Figure 1

Given that in the Indian society, parents have their first child immediately after their marriage; it is useful to distinguish between these births and those that occur after the first birth.

**Response:** Since information related to the maternal and child health indicators are available only for restricted number of births. Therefore, birth order specific analysis could not be carried out. Keeping in view of this limitation, birth order has been considered as a covariate in the analysis. Result clearly indicates that women with lower order of birth were found to be more consistent in utilization of different health care services for a particular birth. Moreover, limitations and data collection issues have already been discussed on page 207.

The concept of consistent utilization has been introduced to include ANC visits, Institutional delivery and immunization. Why is consistent utilization important? One could argue that inconsistent utilization (the obverse of consistent and, say, not using immunization) is more important to understand from policy perceptive.

**Response:** In the present thesis consistent utilization of health care services has been examined using two different approaches. First approach was utilization of multiple services for the most recent birth and second argument was utilization of a particular service across successive births. It is also argued that women should be consistent in both ways so that women and child should receive complete medical care. Also, to improve coverage of maternity services, health planners and policy makers need information on those women who never turned up in an institution for utilization of any type of services as well as those women who were not consistent in their behaviour.
In the writing there is mention of “actual impact” (pp. 11, 13 and other). Such language is difficult to comprehend and is to be edited.

**Response:** In chapter-III and also on page 11 and 13 we have used the word “actual impact” in relation to propensity score matching. Actual impact means the impact which is free from selection bias.

One cannot help but observe the non inclusion of variables such other government services which have been shown to be useful in augmenting the use of MCH services. Unfortunately we are privy to analysis with the available data. But we should realize that such possibilities that do exist can be expressed in terms of proxies and if that it is not possible it should be acknowledged. In the usage of the three components variables for which data are available have not been considered but are included in analysis of contraceptive use.

**Response:** In chapter-III with the help of sensitivity analysis (using Mantel-Haenszel bounds) we have tried to capture the impact of unobserved factors including government programme. However, in chapter-IV we have not included antenatal care as a predictor of institutional delivery because this chapter is based on all births during last five years from the date of survey. NFHS-III data provides antenatal care information only for most recent birth.

The whole exercise has been carried out because of the nature of earlier statistical analyses which have limitations. In this process the importance of arguments about linkages has become secondary. The title though refers to inter linkages there is not much evidence of that in the thesis. An interesting question is that use of any type of contraceptive or even positive attitude about contraceptive can generate an interest in MCH components. This is relevant as most of the women in India are aware of contraception. Or is it women keep away from MCH services because of fear of being asked to use contraception?
Response: I strongly disagree with this comment. The focus of the thesis is to establish inter-linkages between maternal, child health care and contraceptive dynamics. In the thesis we have tried to capture the inter-linkages phenomenon through different dimensions. In chapter-III, we have established the link between two different MCH health care services for a particular birth. In chapter-IV an attempt has been made to show the linkages between utilization of a particular health care service across successive births. However, in the last working chapter inter-linkages phenomena has been extended to the contraceptive adoption. Though, we have not attempted to examine the use of contraceptive or knowledge of contraceptive on utilization of MCH services. This is basically due to the fact that Indian family planning program is being dominated by sterilization method.

The above question have been listed not because the thesis has flaws but to bring to the attention of scholars who are likely to produce quality work in the future like the present thesis. I have no hesitation in recommending that the thesis should be accepted as it is for the Ph.D. degree in Population Studies.
Comments of Examiner-II

Report on the Ph.D. thesis entitled “Inter-linkages between Maternal, Child Health Care and Contraceptive Dynamics in India” by Priyanka Dixit

Based on an excellent review of literature, conceptual framework and analysis of inter-linkages between Maternal, Child Health Care (MCH) and Contraceptive Dynamics in India using different appropriate advanced methodologies, the work is recommended for the award of the Ph.D. degree in Population Studies of International Institute for Population Sciences.

Following are specific comments on the thesis:

1. The thesis is devoted to statistical analysis of the level, trends and patterns of consistent utilization of MCH services, discussed the issue of presence of selection bias in the sample and related methods to correct it. First time, utilization of institutional delivery across successive births has been analyzed after adjusting the behavior of women. Further, using calendar data, continuity of use of family planning services after having child birth in India has also been analyzed. The study has been carried out using three rounds of NFHS data sets.

2. Chapter-1 provides an introduction, research gap, conceptual framework and objectives. The significance of the study and literature reviews of earlier work is also provided in this chapter. Chapter-2 gives the idea about to what extent women are likely to be consistent in utilizing the different MCH services and socioeconomic and demographic profile of the study area. This chapter is important to understand the subject of interest.

3. To establish linkages between utilization of two different health care services namely ANC and institutional delivery and ANC and child immunization, in the third chapter propensity score matching method with a counterfactuals model has been employed. Finally, with the help of Mantel-Haenszel bounds hidden bias has been verified. This
chapter is important to understand the methodological challenges with the limited data in statistics and others factors associated with the study.

4. After controlling important characteristics of women, the fourth chapter deals whether the previous experience of delivering birth in an institution has a positive role in subsequent acceptance of institutional delivery using multilevel model. Subsequently, over/under-dispersion of data has been validated. Result shows that estimated $\sigma_e^2$ value was far below than 1, and highlights the problem of under-dispersion in the model. Finally multivariate response model was constructed to solve the problem of dependency. The analysis of this chapter conforms that previous utilization of institutional delivery was identified as the motivating factor for delivering subsequent birth in an institution.

5. A good exercise has been done to study the linkages between different MCH services to the adoption of contraceptive after child birth in chapter-5. The chapter has also made an assessment of the impact of separate as well as consistent utilization of three MCH indicators - antenatal care visits, institutional delivery and postnatal care on contraceptive initiation after child birth using calendar data. It is said that the Discrete-time hazards complementary log-log multilevel model fitted on women who have adopted spacing method vs. no method.

6. **I am happy to know that Ms. Dixit has successfully published two research papers based on this work in the peer-reviewed journal and the candidate is recommended for the award of Ph.D. degree in Population Studies.**

Response: I am deeply grateful to the reviewer for his/her constructive comments.